

## Speciation Notes - 16-3



## The Process of Speciation

**Species** - a group of organisms that can interbreed and produce fertile offspring.



**Speciation** - the formation of a new species

Populations that become separated or "isolated", gradually become different species

# Isolating Mechanisms

As new species evolve, populations become reproductively isolated from each other.

When members of two populations have been separated for so long they are no longer able to interbreed and produce fertile offspring, they have become reproductively isolated.



## Types of Reproductive Isolation

Reproductive isolation can develop in a variety of ways, including:

Behavioral Isolation

Geographic Isolation

Temporal Isolation

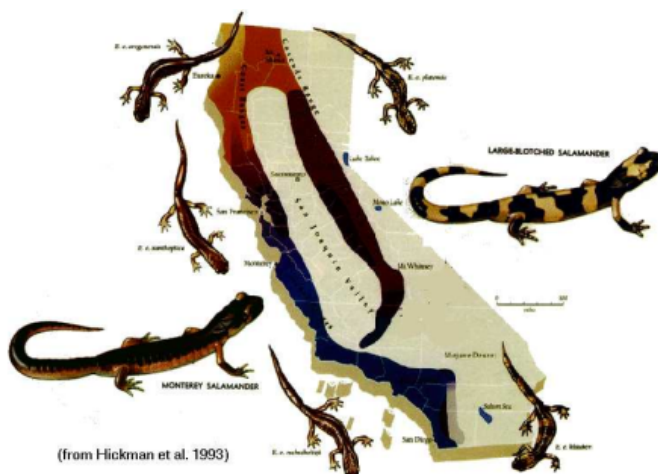
## Behavioral Isolation

- Occurs when two populations are capable of interbreeding but have differences in courtship rituals.



## Geographic Isolation

- Occurs when two populations are separated by geographic barriers such as rivers or mountains.



# Temporal Isolation

-occurs when two or more species reproduce at different times.

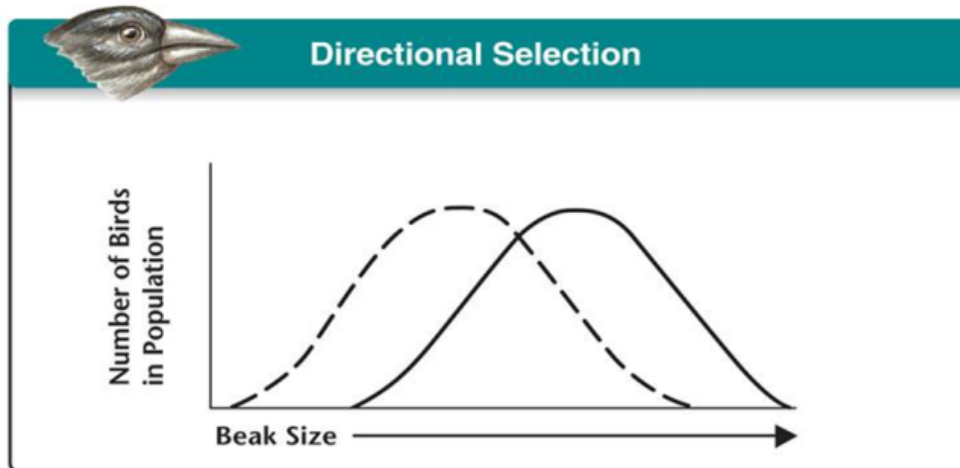


Photo by Dave Harvey

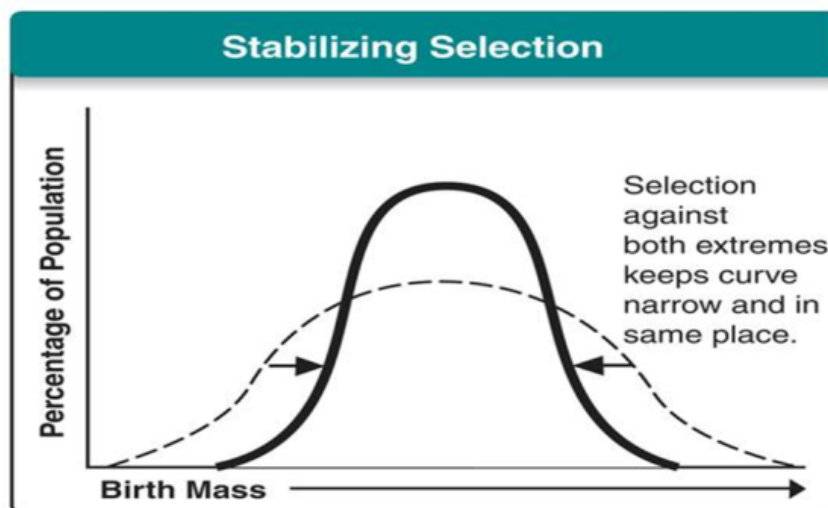
Flowers that release pollen at different times can no longer reproduce with each other.

## Evolution as Genetic Change

Natural selection can effect a population in different ways depending on which variation makes them more fit for their environment.

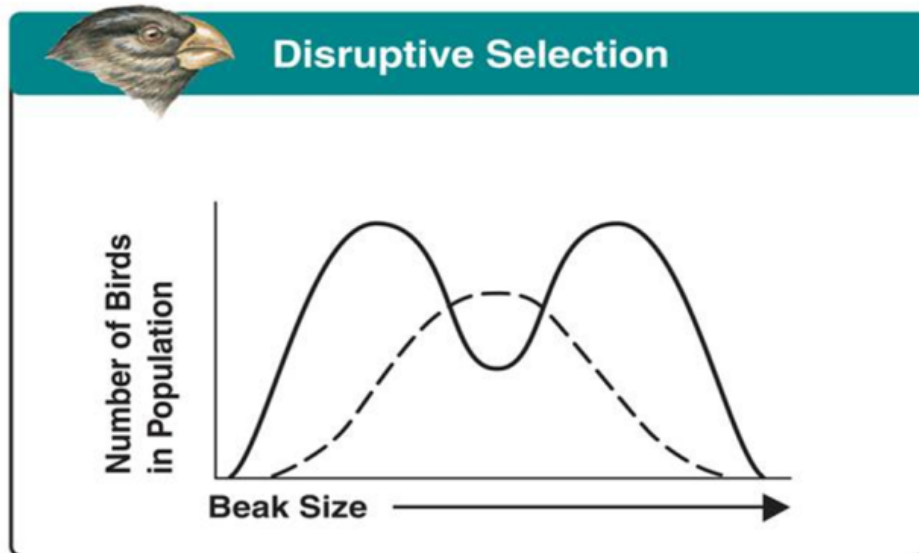


What beak size gives these birds higher fitness?



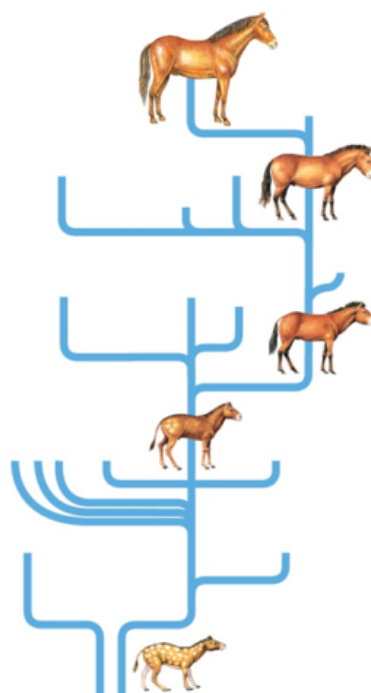
What birth size gives human babies a greater chance of survival?

Which birth sizes have a lesser chance of survival?



What size of seeds would you say are scarce based on this graph?

## Patterns of Evolution



# Macroevolution

**Macroevolution** refers to large-scale evolutionary patterns and processes that occur over long periods of time.

**FIVE important topics in macroevolution are:**

- extinction
- adaptive radiation
- convergent evolution
- coevolution
- punctuated equilibrium

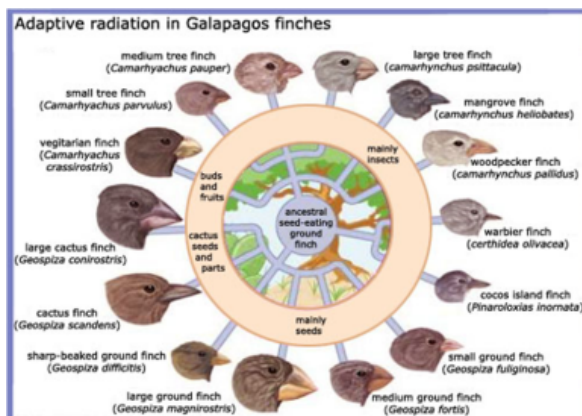
# Extinction

**More than 99% of all species that have ever lived are now extinct**

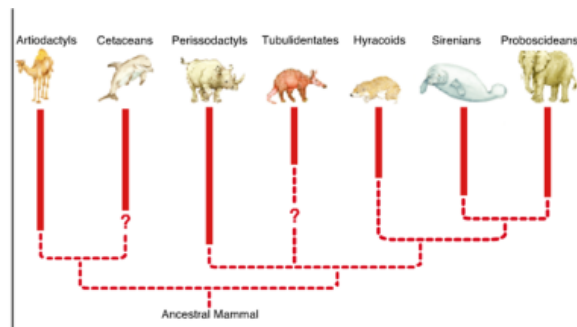


## Adaptive Radiation

**Adaptive radiation** - the process by which a single species or a small group of species evolves into several different forms that live in different ways.



Adaptive radiation in Mammals





# Convergent Evolution

Different organisms undergo adaptive radiation in different places or at different times but in similar environments.

**Convergent evolution** - The process by which unrelated organisms come to resemble one another.

What are some other examples of convergent evolution?



Shark  
© PhredBea, Inc. 2005



Penguins  
© Thomas Lynch/Alamy



Weta Books/Peter Black & Associates

# Coevolution

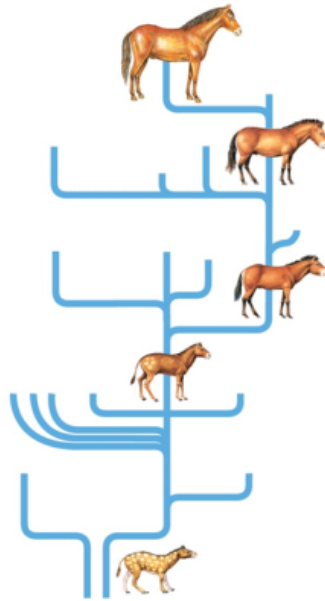
**Coevolution** - The process by which two species evolve in response to each other.



Orchid: © Charles Marden Fitch  
Moth: The Natural History Museum, London

# Punctuated Equilibrium

**Punctuated equilibrium** - a pattern of evolution in which long stable periods are interrupted by brief periods of more rapid change.



# Gradualism

Darwin felt that biological change was slow and steady, an idea known as gradualism.

